

Today's Lead Story

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Fracturing Near Abandoned Wells With Poor Cement Jobs Could Endanger Groundwater; Government Taking Action

By Lynda Harrison

Hydraulic fracturing in Alberta is generally considered safe except, perhaps, in areas where there are poorly cemented wells that have been abandoned, a recent forum heard.

Groundwater protection -- guarding against the possibility of groundwater contamination because of hydraulic fracturing -- is a big concern among Alberta's landowners, said **Robert George**, a hydrogeologist and a policy advisor with the province's water policy branch of the ministry of Environment and Sustainable Resource Development.

"We've looked pretty hard at that. We're pretty sure fractures from 2,000-metre hydraulic fracking operations are not going to migrate upwards to the surface. It's a very, very low risk," George told the **Petroleum Technology Alliance Canada's** eighth annual Spring Water Forum in Calgary.

But there are thousands of old, abandoned wells in Alberta that are a potential risk due to poor cement if they are adjacent to fracturing operations and these need to be addressed, he said.

There are a lot of such wells in the Cardium and they are potential conduits for fracking fluid if they weren't cemented very well in the 1950s or 1960s, he added.

"We think those need to be addressed and we will be addressing those risks," said George, who is working with other government of Alberta staff on the development of a water conservation policy for the oil and gas industry and a policy to address hydraulic fracturing issues.

Hydraulic fracturing of shale formations in combination with horizontal drilling over the last decade has raised questions about potential environmental and human health risks, the meeting heard.

According to the Alberta government, about 170,000 wells have been fractured in the province, starting with conventional vertical wells in the 1950s, and about 4,200 wells have been drilled using multistage fracs since 2008. About two-thirds of those wells were drilled in tight oil plays and roughly 70 per cent of wells drilled today are horizontal.

"The ERCB [Alberta's **Energy Resources Conservation Board**] has documented there haven't been any cases of groundwater being contaminated as a direct result of hydraulic fracturing in Alberta," said George. "So some of the controversy in other parts of the world doesn't seem to directly apply to Alberta. [That] doesn't mean there are no risks. There are risks associated. Hydraulic fracturing is one of the more risky parts of the oil and gas business but we don't see the same level of risk as has been pointed out [in other areas]."

Water use for fracturing operations -- a source of controversy -- has been reduced substantially in some areas over the past few years thanks to innovations surrounding water sources and recycling, he said. The Alberta government believes research and innovation will solve at least part of the problem.

Groundwater sustainability is important, added George. The scale of the shale gas resources in Alberta

are extensive and if the industry is going to use saline or fresh groundwater the government needs to look at how sustainable they are and have a better idea of their inventory, he said.

Companies are required to provide fracture fluid information to the ERCB.

A new approach is needed for areas of full-scale shale gas development. Co-ordination of development is going to be essential to reduce costs and user conflicts, he added. There are infrastructure and construction issues, and ecosystem and community impacts will need attention.

The government needs to reduce growing concerns about water quality and potential contamination from chemical additives to fracture fluids such as friction reducers, biocides and scale inhibitors. Industry must lead and collaborate with other stakeholders on water management plans and infrastructure to minimize development footprints and ecosystem/community impacts, George said.

The Alberta government expects to enhance its regulatory system to address the larger scale and faster pace of shale gas development by expanding programs for groundwater assurance, baseline testing of wells and groundwater inventories, he said.

There will be a greater focus on play-based development planning and outcome-based environmental compliance, George added.

The ERCB is building an unconventional regulatory framework that's more of a play-based, well-by-well, risk-based set of rules that depends on collaboration with industry and between industry players, said George.

Performance measures and public reporting are going to be enhanced among plays where hydraulic fracturing occurs, he added.

Stakeholder engagement is going to be a very big part of play-based development plans so industry and government are going to have to do a better job of engaging with the public and other stakeholders," said George.

Brent Moore, environmental advisor for **Devon Canada Corporation**, told the forum the ERCB conducted a study of all the water well complaints in the province -- 38,000 of them. Only one well had been impacted by the oil and gas industry, he said, adding it was related to a cementing approach that has since been corrected.

The **Canadian Association of Petroleum Producers (CAPP)** admits potential contamination of drinking water can occur from methane gas and fracturing fluid chemicals but shale gas is being developed safely in Canada, **Tara Payment**, CAPP's manager of water and reclamation, told the forum.

She said there have been about 175,000 wells fractured in B.C. and Alberta with no evidence of groundwater contamination due to hydraulic fracturing.

Impacts to water wells due to improper wellbore construction are rare, groundwater protection is regulated at all stages of activity and there are multiple barriers to prevent fluids or gas from migrating from wellbore to aquifers, said Payment.

For example, the typical shale formation is about three kilometres deep while the typical domestic water well is less than 300 metres below surface.

In addition, multiple steel casings are installed and cemented in place and wellbore construction is strictly regulated. Meanwhile, shale rock has low permeability, she added.

CAPP is developing generic procedures for wellbore construction quality assurance. Companies will modify and adopt them, and make them publicly available. "That's one requirement of all the practices, is that you make your own company's practice publicly available so [if] a concerned landowner has a

question about how you're meeting the intent of these practices you should be able to answer them."

The association is also developing generic procedures for transport, handling, storage and disposal of frac fluid additives.

CAPP and PTAC are collaborating on an effects-based shallow groundwater monitoring program for the Horn River, Montney, Cardium and Duvernay. They are also working on an assessment tool for identifying and evaluating alternative water sources using life-cycle analysis. Requests for proposals have been issued for both these projects.

A final report studying surface water flow monitoring standards is under review, as are a report on risks to groundwater from oil and gas drilling and completions and a study of water well testing prior to drilling for coalbed methane.

A request for proposals has been issued for a literature review of regional groundwater monitoring systems.

In addition, CAPP, PTAC and the **Small Explorers and Producers Association of Canada** have started a regional water inventory project in Alberta's key unconventional oil and gas areas.

Payment said B.C., Alberta and Saskatchewan will oversee the development of regional groundwater monitoring policies and protocols. Industry, municipalities and commercial water users will be able to participate in these plans.

Fracfocus.ca, a mandatory chemical disclosure registry for fracturing operations in B.C., was launched Jan. 1, 2012. Mandatory disclosure in Alberta is expected later this year. CAPP's goal is for all provinces -- where there is shale gas development -- to disclose fracturing additives on this website, said Payment.

According to CAPP, fracturing fluids are comprised of 90 per cent water, 9.5 per cent sand and 0.5 per cent additives such as: acids; sodium chlorides; polyacrylamide; ethylene glycol; borate salts; sodium/potassium carbonate; glutaraldehyde; guar gum and isopropanol.

Fracturing fluid additive disclosure requires public disclosure, on a well-by-well basis, the chemical ingredients in the additives used. "You have to disclose your additive name, general purpose, chemical name and concentrations, and where a specific chemical ingredient is considered a trade secret a more general identification is used," said Payment.

There has been some controversy surrounding the revealing of trade secrets but CAPP wants to protect these to encourage innovation, she said.

William Hochheiser, a consultant who spent 33 years as a researcher with the United States Department of Energy, has done an assessment of the risks of hydraulic fracturing for PTAC and the **Science and Community Environmental Knowledge**.

He said that while numerous instances of environmental contamination across North America have been attributed in the popular media to hydraulic fracturing, none of the incidents have been documented to be caused by the process.

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